

CLAIMS

1. (Original) A non-aqueous electrolyte secondary battery comprising:
a battery device having a positive electrode having a collector, on which a positive electrode active material layer containing a positive electrode material is formed, a negative electrode, and a non-aqueous electrolyte layer, the battery device being sealed in a film-state packaging member,
wherein concentration in mass ratio of a free acid in the electrolyte layer is 60 ppm and less.

2. (Original) A non-aqueous electrolyte secondary battery according to claim 1, wherein a metal foil laminate case or a laminated film obtained by coating metal foil with a resin and having a structure of packaging resin layer/metal film/sealant layer is used.

3. (Original) A non-aqueous electrolyte secondary battery according to claim 2, wherein the positive electrode active material is a composite oxide LiMO_2 (where, M is at least one material selected from Co, Ni, and Mn) made of a lithium and a transition metal.

4. (Original) A non-aqueous electrolyte secondary battery according to claim 3, wherein the composite oxide of a lithium and a transition metal is at least one material selected from LiCoO_2 , $\text{Li}_{x}\text{Co}_{1-y}\text{Al}_y\text{O}_2$ (where $0.05 \leq x \leq 1.10$ and $0.01 \leq y \leq 0.10$), LiNiO_2 , $\text{LiN}_{y}\text{C}_{01-y}\text{O}_2$ (where $0 < y < 1$), $\text{L}_{x}\text{N}_{y}\text{M}_{1-y}\text{O}_2$ (where M denotes at least one of transition metals, B, Al, Ga, and In, $0.05 \leq x \leq 1.10$ and $0.7 \leq y \leq 1.0$), and LiMn_2O_4 .

5. (Original) A non-aqueous electrolyte secondary battery according to claim 4, wherein the positive electrode active material is LiCoO₂.

6. (Amended) A non-aqueous electrolyte secondary battery according to claim 1, wherein the electrolyte is made of a lithium salt and a polymer compound, in which the lithium salt is dissolved or mixed, and

one or more polymer compounds selected from the group consisting of ether-based polymers such as which is poly(ethylene oxide) and a crosslinked of the poly(ethylene oxide), poly(methacrylate) ester polymer, acrylate polymer, and fluorine polymer such as which is poly(vinylidene fluoride) and poly(vinylidene fluoride-co-hexafluoropropylene) is/are used.

7. (Original) A non-aqueous electrolyte secondary battery according to claim 1, wherein the electrolyte layer is made of a lithium salt, a non-aqueous solution, and a polymer material, and at least one of LiPF₆, LiBF₄, LiAsF₆, LiClO₄, LiCF₃SO₃, Li(CF₃SO₂)₂N, LiC₄F₉SO₃, LiCl, and LiBr is mixed as a lithium salt.

8. (Withdrawn) A non-aqueous electrolyte secondary battery comprising: a positive electrode having a positive electrode collector, on which a positive electrode active material layer containing a positive electrode material is formed, a negative electrode having a negative electrode collector, on which a negative electrode active material layer is formed, and a film-state case as a packaging member,

wherein average particle diameter of the positive electrode active material lies in a range from 10 to 22 μm.

9. (Withdrawn) A non-aqueous electrolyte secondary battery according to claim 8, wherein the positive electrode active material has minimum particle diameter of 5 μm or larger, maximum particle diameter of 50 μm and less, and specific surface area of 0.25 m^2/g and less.

10. (Withdrawn) A non-aqueous electrolyte secondary battery according to claim 8, wherein the packaging member is a laminated film obtained by coating metal foil with a resin, a polymer film, or a metal film.

11. (Withdrawn) A non-aqueous electrolyte secondary battery according to claim 8, wherein the positive electrode active material is a lithium-transition metal complex oxide LiMO_2 (where, M is at least one material selected from Co, Ni, and Mn).

12. (Withdrawn) A non-aqueous electrolyte secondary battery according to claim 11, wherein the complex oxide of the lithium and the transition metal is at least one material selected from LiCoO_2 , $\text{Li}_{x}\text{Co}_{1-y}\text{Al}_y\text{O}_2$ (where $0.05 \leq x \leq 1.10$ and $0.01 \leq y \leq 0.10$), LiNiO_2 , $\text{LiN}_{y}\text{C}_{01-y}\text{O}_2$ (where $0 < y < 1$), $\text{L}_x\text{N}_{y}\text{M}_{1-y}\text{O}_2$ (where M denotes at least one of transition metals, B, Al, Ga, and In, $0.05 \leq x \leq 1.10$ and $0.7 \leq y \leq 1.0$), and LiMn_2O_4 .

13. (Withdrawn) A non-aqueous electrolyte secondary battery according to claim 12,

wherein the positive electrode active material is LiCoO_2 .

14. (Withdrawn) A non-aqueous electrolyte secondary battery according to claim 8, wherein the electrolyte is made of a lithium salt and a polymer compound, in which the lithium salt is dissolved or mixed, and

one or more polymer compounds selected from ether-based polymers such as poly(ethylene oxide) and a crosslinked of the poly(ethylene oxide), poly(methacrylate) ester polymer, acrylate polymer, and fluorine polymer such as poly(vinylidene fluoride) and poly(vinylidene fluoride-co-hexafluoropropylene) is/are used.

15. (Withdrawn) A non-aqueous electrolyte secondary battery comprising:
a positive electrode having a positive electrode collector, on which a positive electrode active material layer containing a positive electrode material is formed, a negative electrode having a negative electrode collector, on which a negative electrode active material layer is formed, and a film-state case as a packaging member,
wherein the positive electrode active material layer contains 0.15 percent by weight of carbonate compound and less.

16. (Withdrawn) A non-aqueous electrolyte secondary battery according to claim 15, wherein moisture contained in the positive electrode active material is 300 ppm and less.

17. (Withdrawn) A non-aqueous electrolyte secondary battery according to claim 15, wherein the positive electrode active material is a complex oxide LiMO_2 (where, M is at least one material selected from Co, Ni, and Mn) made of a lithium and a transition metal.

18. (Withdrawn) A non-aqueous electrolyte secondary battery according to claim 15, wherein the carbonate contained in the positive electrode active material is LiCoO_3 .

19. (Withdrawn) A non-aqueous electrolyte secondary battery according to claim 17, wherein the complex oxide of a lithium and a transition metal is at least one material selected from LiCoO_2 , $\text{Li}_{x}\text{Co}_{1-y}\text{Al}_y\text{O}_2$ (where $0.05 \leq x \leq 1.10$ and $0.01 \leq y \leq 0.10$), LiNiO_2 , $\text{LiNi}_{y}\text{Co}_{1-y}\text{O}_2$ (where $0 < y < 1$), $\text{Li}_{x}\text{Ni}_{y}\text{M}_{1-y}\text{O}_2$ (where M denotes at least one of a transition metal, B, Al, Ga, and In, $0.05 \leq x \leq 1.10$ and $0.7 \leq y \leq 1.0$), and LiMn_2O_4 .

20. (Withdrawn) A non-aqueous electrolyte secondary battery according to claim 15, wherein the positive electrode active material is LiCoO_2 .

21. (Withdrawn) A non-aqueous electrolyte secondary battery according to claim 15, wherein the packaging member is a aluminum laminate pack obtained by coating aluminum with a resin.

22. (Withdrawn) A non-aqueous electrolyte secondary battery according to claim 15, wherein the electrolyte is made of a lithium salt and a polymer compound in which the lithium salt is dissolved, and

one or more polymer compounds selected from ether-based polymers such as poly(ethylene oxide) and a crosslinked of the poly(ethylene oxide), poly(methacrylate) ester polymer, acrylate polymer, and fluorine polymer such as poly(vinylidene fluoride) and poly(vinylidene fluoride-co-hexafluoropropylene) is/are used.